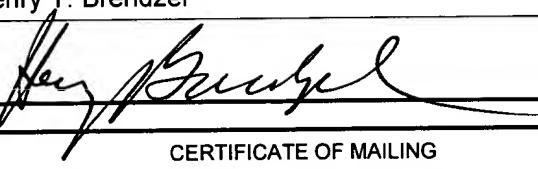
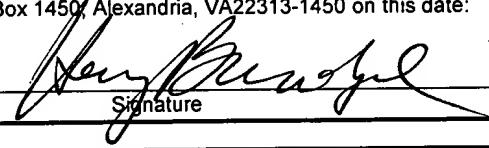


TRANSMITTAL FORM <small>(to be used for all correspondence after initial filing)</small>		<i>Complete if Known</i>	
		Application Number	09/543,284
		Filing Date	4/5/2000
		First Named Inventor	Boris Dmitrievich
		Examiner Name	Thomas H. Stevens
		Group/Art Unit	2123
Total number of pages in this Submission: this page, plus		17	Attorney Docket ID
		Lubachevsky 10-2	

ENCLOSURES (check all that apply)			
<p>If Fee Form is not included, but a fee is due, the Commissioner is Authorized to charge Deposit Account No 500732 of Henry T. Brendzel, and consider that appropriate requests have been made.</p> <p><input type="checkbox"/> Fee Form (<input type="checkbox"/> Check included)</p> <p><input type="checkbox"/> Amendment/Response</p> <p style="margin-left: 20px;"><input type="checkbox"/> After Final</p> <p><input type="checkbox"/> Affidavit(s)/Declaration(s)</p> <p><input type="checkbox"/> Extension of Time Request</p> <p><input type="checkbox"/> Information Disclosure Statement</p> <p><input type="checkbox"/> Certified Copy of Priority document(s)</p> <p><input type="checkbox"/> Response to Missing Parts/ Incomplete Application</p> <p style="margin-left: 20px;"><input type="checkbox"/> Response to Missing Parts under 37 CFR 1.2 or 1.53</p>	<p><input type="checkbox"/> Declaration (no Missing Parts Notice)</p> <p><input type="checkbox"/> Assignment Papers (for an Application)</p> <p><input type="checkbox"/> Drawing(s)</p> <p><input type="checkbox"/> Licensing-related Papers</p> <p><input type="checkbox"/> Petition Routing Slip (TO/SB/69) and Accompanying Petition</p> <p><input type="checkbox"/> To Convert a Provisional Application</p> <p><input type="checkbox"/> Power of Attorney, Revocation or Change of Correspondence Address</p> <p><input type="checkbox"/> Express Abandonment</p> <p><input type="checkbox"/> Terminal Disclaimer</p> <p><input type="checkbox"/> To Convert to Statutory Invention Registration</p>	<p><input type="checkbox"/> Postcard(s)</p> <p><input type="checkbox"/> Small Entity Statement</p> <p><input type="checkbox"/> Request for a Refund</p> <p><input type="checkbox"/> After Allowance Communication to group</p> <p><input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences</p> <p><input checked="" type="checkbox"/> Appeal Communications to Group (Appeal Notice, Brief, Reply Brief)</p> <p><input type="checkbox"/> Proprietary Information</p> <p><input type="checkbox"/> Status Letter</p> <p><input checked="" type="checkbox"/> Other Cover Letter</p>	

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT		
Firm or Individual Name	Henry T. Brendzel	
Signature		
	Date	11/10/05

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I hereby certify that this correspondence is being deposited with the United States Postal Service as service in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this date:		
Henry Brendzel		11/10/05
Name of Person Signing	Signature	Date

CERTIFICATE OF FACSIMILE		
I hereby certify that this correspondence is being electronically transmitted by facsimile to the United States Patent Office:		
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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Patent Application

Inventor(s)	Boris Dmitrievich Lubachevsky Alan Weiss	Case Name	Lubachevsky 10-2
Filing Date	4/5/2000	Serial No.	09/543,284
Examiner	Thomas H. Stevens	Group Art Unit	2123
Title	Discrete Event Parallel Simulation		

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

SIR:

A Notification of Non-Compliant Appeal Brief was received, stating that the following headings were missing: Evidence Appendix, and Related Proceedings Appendix.

The Evidence Appendix WAS sent (page 15) of the brief, and it is a mystery as why it is missing in the PTO file. Other than the heading, the page included nothing – because there was nothing to include. As for the Related Proceedings Appendix, it seems obvious that when the Appeal Brief states that there are no related appeals or interferences that there would not be anything to put in such an appendix.

Nevertheless, in the interest of expediting matters, enclosed please find an amended Brief that includes an amended page 15 and a new page 16.

Dated: 11/10/05

Respectfully,
Boris Dmitrievich Lubachevsky
Alan Weiss

By Henry T. Brendzel
Henry T. Brendzel
Reg. No. 26,844
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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Patent Application

5

Inventor(s)	Boris Dmitrievich Lubachevsky Alan Weiss	Case Name	Lubachevsky 10-2
Filing Date	4/5/2000	Serial No.	09/543,284
Examiner	Thomas H. Stevens	Group Art	2123
		Unit	
Title	Discrete Event Parallel Simulation		

APPEAL BRIEF PURSUANT TO 37 CFR 1.191

Real party in interest

10 The real parties in interest are Lucent Technologies, 600 Mountain Ave. Murray Hill, NJ 07974-0636, the assignee of this application, and the inventors identified above.

Related appeals and interferences

There are no related appeals or interferences.

15

Status of claims

Claims 1-24 stand rejected.

- Claim 1 stands rejected under 35 USC 101 as being directed to non-statutory subject matter¹.
- 20 • Claims 1-24 stand 35 UCS 102(b) and being anticipated by Lubachevsky et al.

Status of amendments

25 The last amendment filed in this case (and admitted) is a supplemental amendment, dated April 4, 2005. An Office Action responsive to this amendment was issued on June 6, 2005, rejecting all claims, as indicated above.

¹ The Examiner's assertion is that the "claimed invention is directed to non-statutory subject matter," and claim 1 is mentioned. No explicit rejection is made of claim 1, and no other claims are mentioned in the Examiner' comments. It is therefore only surmised that claim 1 is rejected, and the status of the other claims vis-à-vis 35 USC 101 is unclear.

Summary of Claimed Subject Matter

The invention is a method to efficiently simulate a physical system where many events occur, and the simulation is effected by use of concurrent processes that 5 communicate with each other, where each process simulating a portion of the overall system and the processing are adapted to communicate with each other to enable interactions so that the entire system can be properly simulated.

The subject matter claimed in independent claim 1 is a method that performs simulations within an arrangement of N concurrently operating processing elements (PEs) 10 where each PE simulates blocks of events, where each block includes M edge events, and in connection of simulating the edge events by a PE, information that originates at another PE is employed. The value of M is defined as approximately equal to $e \log N$.

Independent claim 21 defines a hardware arrangement comprising N PEs where each PE stores a specification of a subsystem (where the subsystems interact to form a 15 whole system), and each of the PEs simulates events in blocks that include M edge events (M defined as above).

Independent claim 22 defines a storage element that includes a first (processing) module that, when executed in a processor, simulates operational events of a stored subsystem that is part of a system of interacting subsystems, in blocks that contain M 20 edge events in addition to non-edge events (M defined as above), and a second module that outputs simulated operational events resulting from execution by the first module.

Grounds of Rejection to be Reviewed on Appeal

There are two primary issues to be resolved:

25 1. Whether the claimed invention is directed to statutory subject matter; and
2. Whether the reference cited by the Examiner anticipates the subject claims. A related issue is whether the Examiner gave proper consideration to the submitted Rule 132 Affidavit.

Argument

Issue (1): Is the claimed subject matter statutory?

The issue is framed in terms of “claimed subject matter” because the Examiner has not explicitly rejected any claim. In the remarks that relate to 35 USC 101 the

5 Examiner refers to claim 1 (and only to claim 1), and while this gives rise to the notion that claim 1 is rejected, and applicants so assume, the status of the other claims vis-à-vis 35 USC 101 is certainly not clear.

The Examiner asserts that the claimed invention is directed to non-statutory subject matter “by way of a computer-based mathematical solver.” More specifically, the
10 Examiner asserts that (1) “there is no mention of a platform or application in mind,” (2) the claims reflect ‘a shell’ of the function without a ‘core’ of a specific platform, and (3) the post-solution activity is from an outside agency and not by the invention itself.

Respectfully, the Examiner is wrong on all counts, and a proper analysis of the claims reveals that the claims do define statutory subject matter.

15 Although the Examiner’s first assertion is that the claimed subject matter is a “computer-based mathematical solver,” and a solver is a “thing,” and “things” are clearly statutory subject matter, it is fair to note that claim 1 is a method claim, and that the Examiner is really asserting that the claimed *method* is directed to or contains a mathematical algorithm and on the whole is not statutory.

20 To reach a conclusion regarding whether a claim is statutory or not, a proper analysis requires the Examiner to (a) first determine what the applicant has invented and (b) determine what the applicant is seeking to patent – and by extension what the applicant has not invented and is NOT seeking to patent.

What was not invented and what was invented:

25 In the case at hand,

- Applicants did not invent simulation of a physical system by use of a computer.
- Applicants did not invent simulation of a physical system by use of a plurality of concurrently processing and interacting individual processing element.
- Applicants did not invent a mathematical algorithm that is used to simulate the physical system.

- Applicants did not invent a mathematical algorithm that is used to control the simulation of a physical system

What applicants did invent a method for simulating the operation of a physical system by use of a plurality of concurrently processing and interacting individual processing element, where the simulation is performed by way of simulating events that trigger other events, and the events that are simulated by the arrangement of concurrently processing and interacting individual processing elements are taken in blocks of a chosen number of edge events.

Respectfully, applicants believe that the Examiner failed to demonstrate that he determined what applicants have invented, and certainly has not indicated that applicants invented what the paragraph immediately above states.

What the applicant is seeking to patent

In claim 1, applicants seek to patent a method “for simulating events in a physical system.” More specifically,

- 15 ► Claim 1 specifies in step (a) “employing hardware that comprises N processing elements (PEs) that can communicate with each other.” Clearly, there is no explicit or implicit mathematical algorithm in step (a) of claim 1.
- In step (b) claim 1 specifies “subdividing said physical system into N subsystems and assigning a different subsystem of said subsystems to each of said N PEs.” This step also does not define a mathematical algorithm explicitly or implicitly.
- 20 ► In step (c) claim 1 specifies that the simulation is in blocks of entities called “edge events” and specifies the sizes of the blocks in terms of a number of those “edge events.” Specifying a number is not (and has never been asserted to be) a mathematical algorithm and, therefore, this step is also not defining – explicitly or implicitly – a mathematical algorithm.
- The last two steps of claim 1 also do not define a mathematical algorithm and, to summarize, none of the steps that make up claim 1 explicitly or implicitly include a mathematical algorithm.

In short, in claim 1 (and all claims that depend on claim 1) applicants seek to patent a non-mathematical process executed in a computer. The process is in the

technological arts, and is extremely useful because it enables one to determine whether the operation an event-triggered physical system (which most physical systems are) is proper, without actually running the system. Applicants' invention is particularly useful for simulating very complex systems and a simulation with a single processor would take 5 an unreasonably long time to execute.

As for the Examiner's second assertion mentioned above, it is not clear what the Examiner means by a "shell" of a function, but clearly the assertion of "without a 'core' of a of a specific platform" is incorrect for the reason expressed above.

As for the Examiner's assertion third assertion mentioned above of no post 10 solution activity, it is respectfully noted that the Examiner failed to identify what Examiner considers to be the mathematical algorithm or what the mathematical algorithm solves. Respectfully, one should not be allowed to make assertions about post solution activity until one identifies where the "solution" begins and ends and, certainly, one cannot rebut any assertions regarding post solution activity until the "solution" is 15 identified. In the particular case at hand, however, as argued above, applicants respectfully submit that there is no mathematical algorithm and no solution of anything in any of the claim 1 steps and, therefore, the question of post-solution activity is meaningless. If the Examiner disagrees, the Examiner is invited to specify what the mathematical algorithm is that claim 1 defines.

20 Applicants further submit that even if, *arguendo*, in the course of implementing an edge event of some particular simulated system a mathematical algorithm must be executed (for example, whether a particular event occurs or does not occur depends on some mathematical equation), then the mathematical algorithm ends, and the solution comes into being *when the mathematical equation is solved relative to the simulated edge event*. In such a case, however, there is clearly a post-solution activity following the 25 solution (end of the mathematical algorithm) because in order to simulate an edge event in one PE according to claim 1 information pertaining to an edge event from another of the communicating PEs is used. Thus, the post solution activity that the claim effectively specifies (if it is argued that the step of simulating an event might have some 30 mathematical algorithm) is the communication of the solution from one PE to another PE.

To reaffirm, it is respectfully submitted that claim 1 does not define a mathematical algorithm, and that if a non-specified and not claimed (and thus not preempted) mathematical algorithm is executed sometime in the course of the method's execution, the results of that solution are employed in a post solution activity within the arrangement 5 of interacting processing elements.

To restate the above:

1. *The claimed method defines no mathematical algorithm.* Though a simulation is algorithmic in the sense that all computer programs are algorithmic, there is nothing in the claims that defines a *mathematical* algorithm, and nothing in the idea of simulating a system that inherently requires the simulation algorithm to be a 10 *mathematical* algorithm. Keeping in mind that the basic admonition in the law is to not pre-empt a mathematical algorithm (and all of the rules are set forth in order to determine whether a mathematical algorithm is pre-empted in cases where a claim specifies a mathematical algorithm), in claim 1 there is nothing mathematical that is 15 claimed, and there is nothing mathematical that is pre-empted.
2. *The method is executed in a particular hardware arrangement* (N parallel processors, operating on N subsystems of a system to be simulated). There are many embodiments that would NOT infringe claim 1, even if whatever algorithm is used for simulating the system were a mathematical algorithm. The lack of pre-emption of any 20 mathematical algorithm by virtue of the fact that only a very specific hardware arrangement can possibly cause an infringement clearly demonstrates that claim 1 is statutory.
3. *The claim relates to a real-live physical system*, as to what is simulated, which makes the method statutory. *Arrhythmia Research Technology v. Corazonix Corp.* 958 F.2d 25 1053 (Fed. Cir. 1992).
4. *The claim, which defines a method for simulating a physical system, clearly has practical utility*, and therefore it is statutory. *State Street Bank & Trust v. Signature Financial Group*, 149 F.3d 1368 (Fed. Cir. 1998) cert denied.
5. *There is clearly a “post solution” activity* to whatever mathematical algorithm 30 activity is taken while executing the claimed method (which activity is not claimed) in

that the results of that activity, relative to edge events, are communicated from one PE within the simulation arrangement to another PE within the simulation arrangement.

Claim 1 is totally silent regarding the simulation of non-edge events.

5 Addressing independent claim 21, it defines an apparatus that includes N interacting processing elements (PEs). The Examiner has not explicitly asserted that this claim is non-statutory but inasmuch as the Examiner's assertion pertains to "the claimed invention," applicants address claim 21 and respectfully assert that the apparatus of claim 21 is clearly statutory. No indication to the contrary has been offered by the Examiner.

10

Addressing independent claim 22, it defines a storage element, and the above remarks relative to claims group B apply with equal force to claims group C.

15 **Issue (2): Are claims 1-24 anticipated by Lubachevsky et al ("synchronous Relaxation for Parallel Simulations with Applications to Circuit-Switched Networks")?**

In a March 10, 2004 Office action the Examiner paraphrased claim 1 and asserted that the claim is anticipated by the reference. In support of the assertion the Examiner pointed to specific passages in the reference. In the response, applicants traversed, 20 explained that the reference cited by the Examiner seems to be one by Eick et al, where Lubachevsky is a co-author, and addressed each of the citations set forth by the Examiner, explaining why claim 1 is not anticipated.

In the next Office action, dated October 10, 2004, the Examiner apparently agreed that the relevant reference is the one by Eik et al, stated that applicants' remarks were 25 unpersuasive, explained his reasoning, and reiterated the rejection.

Applicants believe that the Examiner's reading of the reference is incorrect, and in an effort to overcome the rejection, an affidavit was submitted by Dr. Matthew Andrews. Admittedly, because of a typographical error the caption of the affidavit stated that it is under 37 CFR 1.131 instead of 37 CFR 1.132, and the Examiner chose to not overlook 30 the error. An RCE was filed on March 31, 2005, amending claim 1, adding some claims, presenting arguments in favor of patentability, and re-submitting the affidavit with a

corrected caption (enclosed).

In the Office Action dated June 6, 2005 the Examiner reiterated the 35 USC 102 rejection without remarks relative to applicants' arguments and without remarks relative to the submitted affidavit. In an interview summary dated June 30, 2005 the Examiner 5 stated that "a 35 [sic] C.F.R 1.131 cannot overcome a 102(b) rejection." Aside from the Examiner's own typographical error, it is noted that what was submitted is a Rule 132 affidavit, which may be used for overcoming rejections based on art.

It is noted that at point 12 the affidavit states,

- (a) The specification of tasks for the PEs of the reference is in terms of a time interval, and not in terms of number of events.
- (b) At those different time intervals Δ , the PEs may be called upon to compute different numbers of events.
- (c) Other than in situations of the variation mentioned in point 11 above, at the end of each step, all of the PEs are at a known time instant ($i\Delta$).
- (d) Even in situations of the variation mentioned in point 11 above, the method aims to have all PEs at the aforementioned time instant, and only those PEs that have more than B number of events will be at some other instant.
- (e) In any event, the method described in the reference operates primarily with time intervals as the demarcation points between computation steps rather than number of events as demarcation points between computation steps.

In contradistinction, claim 1 specifies operation in terms of blocks of number of events -- and not time horizons. More particularly, it defines blocks of events that 25 contain a specified number of edge events (in contrast to non-edge events)

Also, it is noted that the affidavit states at point 8 that the time interval D can be chosen on the order of " $N/\log N$," where N is the number of PE's used (taking the liberty to change the letter M that is in the reference and in the affidavit to the letter N, which is used in applicants' claim 1). In contradistinction, claim 1 specifies " $\log N$." Clearly 30 " $N/\log N$ " is not the same as " $\log N$."

It light of the above, it is respectfully requested that the Examiner has not given proper weight to applicants arguments, and it appears that the Examiner has given no consideration whatsoever to the affidavit.

It is also respectfully submitted that a reading of the reference as a whole (and not 5 only a sentence here and a sentence there) clearly indicates that claim 1 is directed to subject matter that is not disclosed in the reference.

It is respectfully submitted that the Examiner erred in his assertion that the claimed invention is directed to non-statutory subject matter, and also erred in his assertion of anticipation by the above-identified reference. Applicants therefore 10 respectfully request that the Board return the case to the Examiner with a directive to rescind the rejections and to allow all claims.

Respectfully,

15 By _____
Henry T. Brendzel, Attorney
Reg. No. 26844
973 467-2025

Date: _____

Claims Appendix

1. A method executed in hardware for simulating events in a physical system comprising the steps of:

5 a) employing hardware that comprises N processing elements (PEs) that can communicate with each other;

 b) subdividing said physical system into N subsystems and assigning a different subsystem of said subsystems to each of said N PEs;

 c) in a simulation step, each of said PEs concurrently simulating a respective 10 block of events that occur in each respectively assigned subsystem, where said block includes M edge events, where M is approximately $e \log_e N$, e is approximately 2.71828, and an edge event is an event whose simulation in a processing element is directly affected by information originating in another processing element;

 repeating step c) a chosen number of times; and

15 outputting results of said simulations from each of said N PEs.

1. The method of claim 1 where said simulation step comprises one or more iterations.

20 2. The method of claim 1 where each of said iterations comprises a simulation phase followed by a communication phase and an assessment phase.

25 3. The method of claim 2 where, in each communication phase, each of said PEs shares information with one or more other PEs from said N PEs, which information is needed by said other PEs to simulate edge events of said other PEs.

30 4. The method of claim 3 where said information shared by each PE in a communication phase of an iteration is related to events simulated by said each PE in said iteration.

5. The method of claim 3 where said assessment phase carried out by each of said
PEs comprises the steps of

determining whether the existence of a simulation error can be excluded, and
directing that another simulation iteration is to take place when the existence of a
simulation error cannot be excluded.

6. The method of claim 5 further comprising a floor advancement step that is
carried out in each of said PEs when said step of determining in said assessment phase
concludes that there are no simulation errors in a simulation iteration, where the

10 advancement step advances a simulation floor time of a present simulation step to form a
modified simulation time floor, for simulating another block of M events in a next
simulation step.

7. The method of claim 5 further comprising a step of advancing a simulation
15 floor time from a simulation floor time of a present simulation step, to form a modified
simulation floor time, for starting from said modified simulation floor time the simulation
of another block of M events in a next simulation step, when said step of determining in
said assessment phase concludes that there are no simulation errors in said present
simulation step.

20 8. The method of claim 7 where said modified simulation floor time corresponds
to the earliest simulation time of the Mth edge event simulated by said N PEs in said
present simulation step.

25 9. The method of claim 3 where events are simulated seriatim in each simulation
phase.

10. The method of claim 9 where for simulating a second event following a
simulation of a first event,

a time interval is identified between a simulation time of said first event and a simulation time of said second event, and
said second event is identified for simulation.

5 **11.** The method of claim **10** where said second event is identified for simulation following a step of accounting for simulation of said first event and simulation of events in said other PEs from said N PEs.

10 **12.** The method of claim **11** where said accounting is based on present knowledge of states of said other events.

15 **13.** The method of claim **11** where said accounting for simulation of events in said other PEs from said N PEs accounts for events simulated during said time interval.

15 **14.** The method of claim **10** where said second event is identified by employing a first random number.

20 **15.** The method of claim **10** where said time interval is identified with a second random number.

16. The method of claim **15** where said second random number is set to said first random number.

25 **17.** The method of claim **14** where said first random number is derived from a random variable having a uniform distribution.

30 **18.** The method of claim **14** where the seriatim simulation of each event in said block of M events, in a first iteration starting from a given simulation floor time, employs an independently derived random number from said random variable, forming thereby a sequence of random numbers, and simulation of said block of M events in all subsequent

iterations starting from said given simulation floor time employs said sequence of random numbers.

19. The method of claim 17 where the sequence of random numbers employed in
5 one simulation step is different from a sequence of random numbers employed in another
simulation step.

20. Apparatus that includes N interacting processing elements (PEs), the
improvement characterized by:

10 each of said N PEs storing a specification of a subsystem of a system composed of
interacting subsystems; and
said N PEs (a) executing a selected number of simulation steps, and in each
simulation step each of said PE's simulates a block of operational events of its associated
subsystem, where a block contains M edge events, where M is approximately equal to
15 $\log N$, and an edge event is an event whose simulation in a processing element is directly
affected by information originating in another processing element, and (b) outputting
results of the simulations.

21. A storage element comprising:

20 a first module that, when executed in a processor, simulates operational events of
a stored subsystem that is part of a system of interacting subsystems, primarily in blocks
that contain M edge events, in addition to non-edge events, where M is approximately
equal to $\log N$, and an edge event is an event whose simulation in a processing element is
directly affected by information originating from simulations by another module that is
25 substantially the same as said first module, which other module is executed in another
processor; and
a second module that outputs simulated operational events resulting from
execution of said first module.

22. The storage element of claim **21** further comprising a third module that communicates with said other module.

23. The storage element of claim **22** further comprising a fourth module that
5 assesses whether, based on information received by said third module, any of said M edge events need to be re-simulated.

Evidence Appendix

NO EVIDENCE IS RELIED ON IN CONNECTION WITH THIS APPEAL.

Related appeals and interferences Appendix

THERE ARE NO RELATED INTERFERENCES OR APPEALS.

It light of the above, it is respectfully requested that the Examiner has not given proper weight to applicants arguments, and it appears that the Examiner has given no consideration whatsoever to the affidavit.

5 It is also respectfully submitted that a reading of the reference as a whole (and not only a sentence here and a sentence there) clearly indicates that claim 1 is directed to subject matter that is not disclosed in the reference.

10 It is respectfully submitted that the Examiner erred in his assertion that the claimed invention is directed to non-statutory subject matter, and also erred in his assertion of anticipation by the above-identified reference. Applicants therefore respectfully request that the Board return the case to the Examiner with a directive to rescind the rejections and to allow all claims.

Respectfully,

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Henry T. Brendzel, Attorney
Reg. No. 26844
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Date: 11/10/05

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- b) subdividing said physical system into N subsystems and assigning a different subsystem of said subsystems to each of said N PEs;
- c) in a simulation step, each of said PEs concurrently simulating a respective 10 block of events that occur in each respectively assigned subsystem, where said block includes M edge events, where M is approximately $e \log_e N$, e is approximately 2.71828, and an edge event is an event whose simulation in a processing element is directly affected by information originating in another processing element;
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20 2. The method of claim 1 where each of said iterations comprises a simulation phase followed by a communication phase and an assessment phase.

25 3. The method of claim 2 where, in each communication phase, each of said PEs shares information with one or more other PEs from said N PEs, which information is needed by said other PEs to simulate edge events of said other PEs.

30 4. The method of claim 3 where said information shared by each PE in a communication phase of an iteration is related to events simulated by said each PE in said iteration.

5. The method of claim 3 where said assessment phase carried out by each of said
PEs comprises the steps of

determining whether the existence of a simulation error can be excluded, and
directing that another simulation iteration is to take place when the existence of a
simulation error cannot be excluded.

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10 advancement step advances a simulation floor time of a present simulation step to form a
modified simulation time floor, for simulating another block of M events in a next
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simulation floor time, for starting from said modified simulation floor time the simulation
of another block of M events in a next simulation step, when said step of determining in
said assessment phase concludes that there are no simulation errors in said present
simulation step.

20

8. The method of claim 7 where said modified simulation floor time corresponds
to the earliest simulation time of the Mth edge event simulated by said N PEs in said
present simulation step.

25

9. The method of claim 3 where events are simulated seriatim in each simulation
phase.

10. The method of claim 9 where for simulating a second event following a
simulation of a first event,

a time interval is identified between a simulation time of said first event and a simulation time of said second event, and
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5 **11.** The method of claim **10** where said second event is identified for simulation following a step of accounting for simulation of said first event and simulation of events in said other PEs from said N PEs.

10 **12.** The method of claim **11** where said accounting is based on present knowledge of states of said other events.

15 **13.** The method of claim **11** where said accounting for simulation of events in said other PEs from said N PEs accounts for events simulated during said time interval.

16 **14.** The method of claim **10** where said second event is identified by employing a first random number.

20 **15.** The method of claim **10** where said time interval is identified with a second random number.

25 **16.** The method of claim **15** where said second random number is set to said first random number.

17. The method of claim **14** where said first random number is derived from a random variable having a uniform distribution.

30 **18.** The method of claim **14** where the seriatim simulation of each event in said block of M events, in a first iteration starting from a given simulation floor time, employs an independently derived random number from said random variable, forming thereby a sequence of random numbers, and simulation of said block of M events in all subsequent

iterations starting from said given simulation floor time employs said sequence of random numbers.

19. The method of claim 17 where the sequence of random numbers employed in
5 one simulation step is different from a sequence of random numbers employed in another
simulation step.

20. Apparatus that includes N interacting processing elements (PEs), the
improvement characterized by:

10 each of said N PEs storing a specification of a subsystem of a system composed of
interacting subsystems; and
said N PEs (a) executing a selected number of simulation steps, and in each
simulation step each of said PE's simulates a block of operational events of its associated
subsystem, where a block contains M edge events, where M is approximately equal to
15 log N, and an edge event is an event whose simulation in a processing element is directly
affected by information originating in another processing element, and (b) outputting
results of the simulations.

21. A storage element comprising:

20 a first module that, when executed in a processor, simulates operational events of
a stored subsystem that is part of a system of interacting subsystems, primarily in blocks
that contain M edge events, in addition to non-edge events, where M is approximately
equal to log N, and an edge event is an event whose simulation in a processing element is
directly affected by information originating from simulations by another module that is
25 substantially the same as said first module, which other module is executed in another
processor; and

a second module that outputs simulated operational events resulting from
execution of said first module.

22. The storage element of claim **21** further comprising a third module that communicates with said other module.

23. The storage element of claim **22** further comprising a fourth module that
5 assesses whether, based on information received by said third module, any of said M edge events need to be re-simulated.

Evidence Appendix

NO EVIDENCE IS RELIED ON IN CONNECTION WITH THIS APPEAL.

Related appeals and interferences Appendix

THERE ARE NO RELATED INTERFERENCES OR APPEALS.